DEPARTMENT OF TRANSPORTATION
MATERIALS TRANSPORTATION BUREAU
WASHINGTON, D.C. 20590

[Docket No. HM-151A, Amdt. No. 172-50]

PART 172—HAZARDOUS MATERIALS TABLE AND HAZARDOUS MATERIALS COMMUNICATIONS REGULATIONS

Label and Placard Colors

AGENCY: Materials Transportation Bureau, Research and Special Programs Administration, DOT.

ACTION: Final rule.

SUMMARY: This rule restates requirements applicable to colors specified for labels printed directly onto the surfaces of packagings used in the transportation of hazardous materials.

Existing standards prescribing colors required to appear on hazardous materials warning labels and placards are color tolerance charts displaying the colors represented by Munsell notations as the basis for evaluating compliance.

The quality of colors of labels printed on the various materials used to manufacture boxes, bags and other packagings have proved difficult to control, because of the printing processes which must be used and the porosity and pigmentation of such surfaces. Therefore, a two-year suspension of the color standards was provided for labels printed directly onto the surfaces of packagings so that adjustments to printing techniques and inks could be made and, if necessary, so modification to the color standards could be made (42 FR 34283, July 5, 1977). This final rule contains color standards for such hazard warning labels to replace those existing standards that would otherwise apply on and after March 1, 1979.

DATES: The provisions of this rule are effective March 19, 1979.

ADDRESS COMMENTS TO: Dockets Branch, Materials Transportation Bureau, Washington, D.C. 20590. It is requested that five copies be submited.

FOR FURTHER INFORMATION CONTACT:

Douglas A. Crockett, Standards Division, Office of Hazardous Materials Regulation, Washington, D.C. 20590 (phone: 202-426-2075).

SUPPLEMENTARY INFORMATION: A color standard for label and placard colors was published as a final rule Docket No. HM-103/112 on 5, 1976 (41 FR 15972), compliance with which became mandatory on January 1, 1977. That standard, proposed in 1974 under Docket No. HM-103 (39 FR 3164, January 24, 1974) and amended by Docket No. HM-151 (42 FR 34283, July 5, 1977), involved two series of color charts provided by DOT that display standard colors. The colors on the charts are also numerically described by Tables 1 and 2 of Appendix A to Part 172 through certain technical specifications (Munsell notations). The visual display on each chart incorporates a degree of latitude, or tolerance, to account for variations in printing materials and processes and to serve as a visual control on label and placard colors, while the Munsell notations were provided to ensure constancy and reproducibility of the Color Tolerance Charts.

In 1976 it became necessary to suspend that standard so far as it applied to labels printed directly onto the surfaces of a packaging, because such surfaces could not be controlled for printing purposes without great expense. Fiberboard, for example, is both pigmented and porous, with the result that pigments applied to it are absorbed and their visual effects modified. The suspension terminates on March 1, 1979, at which time the previously published standard applies. During the suspension, several trade associations concerned with aspects of packaging manufacture have examined existing conditions and have recommended to the Materials Transportation Bureau (Bureau) that the previously published standard be modified to account for the difficulties encountered in printing on kraft and fiberboard.

This amendment contains a color standard recommendation that was developed during the past 18 months by representatives of the container Corporation of America, the Fibre Box Association and the Paper Shipping Sack Manufacturing Association. The Bureau has reviewed this recommendation, finds it reasonably consistent with the existing standard, and adopts it. To produce this recommended standard, inks were selectively obtained and mixed and an improved quality control was used in the printing processes. Although reproduction of the previously published DOT color tolerances was the object of this industry effort, the printing processes and the porosity and pigmentation variations of kraft paper and fiberboard surfaces necessitate new color tolerances. Similar difficulties have caused these associations to advise that they are not able to produce color tolerance charts for visual reference for compliance. Consequently, the color tolerances developed in this manner are represented in Table 3 by Commission Internationale de L'Eclariage (C.I.E.) coordinates only. DOT will use the existing color charts for compliance purposes, although resort to instrumentation will be necessary where an initial visual reference indicates that the colors of a label printed on a packaging surface are improper.

To assist those who may prefer instrumentation to ensure compliance with color requirements for placards and for labels which are not printed on packaging surfaces, the C.I.E. coordinates have been added to the Munsell notation for the existing Color Tolerance Charts (see new Tables 1 and 2). This will result in C.I.E. coordinates being available for instrumentally evaluating all hazardous materials warning labels and placards.

Although the work described above was performed with variations of kraft and fiberboard surfaces, the Bureau has made the standards applicable to labels printed on any packaging surface, regardless of the substrate. Kraft paper and fiberboard represents the most difficult case, but other situations may exist wherein the manufacturer's inability to select a printing substrate, due to structural requirements and economic factors affecting packaging construction, may result in deviations from the previously published standard. The temporary two-year suspension of the previously published standard has been extended to July 1, 1979, to allow time for packaging manufacturers to modify their processes to bring them into compliance with the new standard published in this document. However, they have a choice of compliance with either Table 1, 2, or with Table 3.

Since the previously published standard would otherwise apply to labels printed on packaging surfaces after March 1, 1979, the less restrictive standards published in this document constitute a relaxation of existing requirements. This amendment is not expected to impose any additional costs or burdens on the public, industry or government nor to have any significant environmental or economic impact. The amendment in fact results from petitions received from the fiberboard and kraft paper packaging industries. In view of the above, the Bureau finds that public notice is unnecessary. However, comments are welcome and should be sent to the address indicated earlier.

Primary drafters of this document are Lee E. Metcalfe and Douglas A. Crockett, Office of Hazardous materials Regulation.

In view of the foregoing, Part 172 of Title 49, Code of Federal Regulations, is amended as follows:

1. In § 172.407 paragraph (d)(5) is revised to read as follows:

§ 172.407 Label specifications.

* * * * *

(d) * * *

(5) The requirements of paragraph (d) of this section do not apply to labels printed directly onto the surface of a packaging before July 1, 1979: *Provided,* The colors of such labels comply with the appropriate colors described in §§ 172.411 through 172.450. Such labels printed on or after July 1, 1979, must comply with color specifications in one of the appropriate tables in Appendix A to this Part.

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2. In Appendix A to Part 172, the headings and Tables 1 and 2 are revised: Table 3 is added to read as follows:

APPENDIX A—HAZARDOUS MATERIALS COLOR TOLERANCE TABLES

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TABLE 1.—*Paint, Lacquer, Enamel, and Plastic Color Specifications in Munsell Notations and CIE Coordinates* [1]

Color	Munsell notations	CIE data for source C		
		Y	x	y
Red:				
Central color	7.5R 4.0/14	12.00	.5959	.3269
Orange	8.5R 4.0/14	12.00	.6037	.3389
Purple and vivid	6.5R 4.0/14	12.00	.5869	.3184
Grayish	7.5R 4.0/12	12.00	.5603	.3321
Vivid	7.5R 4.0/16	12.00	.6260	.3192
Light	7.5R 4.5/14	15.57	.5775	.3320
Dark	7. 5R 3.5/14	09.00	.6226	.3141
Orange:				
Central color	5.0YR 6.0/15	30.05	.5510	.4214
Yellow and Grayish	6.25YR 6.0/15	30.05	.5452	.4329
Red and vivid	3.75YR 6.0/15	30.05	.5552	.4091
Grayish	5.0YR 6.0/13	30.05	.5311	.4154
Vivid	5.0YR 6.0/16	30.05	.5597	.4239
Light	5.0YR 6.5/15	36.20	.5427	.4206
Dark	5.0YR 5.5/15	24.58	.5606	.4218
Yellow:				
Central color	5.0Y 8.0/12	59.10	.4562	.4788
Green	6.5Y 8.0/12	59.10	.4498	.4865
Orange and vivid	3.5Y 8.0/12	59.10	.4632	.4669
Grayish	5.0Y 8.0/10	59.10	.4376	.4601
Vivid	5.0Y 8.0/14	59.10	.4699	.4920
Light	5.0Y 8.5/12	68.40	.4508	.4754
Dark	5.0Y 7.5/12	50.68	.4620	.4823
Green:				
Central color	7.5G 4.0/9	12.00	.2111	.4121
Bluish	0.5BG 4.0/9	12.00	.1974	.3809
Green-yellow	5.0G 4.0/9	12.00	2237	.4399
Grayish A	7.5G 4.0/7	12.00	.2350	.3922
Grayish B [2]	7.5G 4.0/6	12.00	.2467	.3822
Vivid	7.5G 4.0/11	12.00	.1848	.4319
Light	7.5G 4.5/9	15.57	.2204	.4060
Dark	7.5G 3.5/9	09.00	.2027	.4163
Blue:				
Central color	2.5PB 3.5/10	0.900	.1691	.1744
Purple	4.5PB 3.5/10	0.900	.1796	.1711
Green and vivid	10.0B 3.5/10	0.900	.1557	.1815
Grayish	2.5PB 3.5/8	0.900	.1888	.1964
Vivid	2.5PB 3.5/12	0.900	.1516	.1547
Light	2.5PB 4.0/10	12.00	.1805	.1888
Dark	2.5PB 3.0/10	0.655	.1576	.1600

TABLE 1.—*Paint, Lacquer, Enamel, and Plastic Color Specifications in Munsell Notations and CIE Coordinates* [1]—Continued

Color	Munsell notations	CIE data for source C		
		Y	x	y
Purple:				
Central color	10.0P 4.5/10	15.57	.3307	.2245
Reddish purple	2.5RP 4.5/10	15.57	.3584	.2377
Blue purple	7.5P 4.5/10	15.57	.3068	.2145
Reddish gray	10.0P 4.5/8	15.57	.3280	.2391
Gray [2]	10.0P 4.5/6.5	15.57	.3254	.2519
Vivid	10.0P 4.5/12	15.57	.3333	.2101
Light	10.0P 5.0/10	19.77	.3308	.2328
Dark	10.0P 4.0/10	12.00	.3306	.2162

[1] Maximum chroma is not limited.

[2] For the colors green and purple, the minimum saturation (chroma) limits for porcelain enamel on metal are lower than for most other surface coatings. Therefore, the minimum chroma limits of these two colors as displayed on the Charts for comparison to porcelain enamel on metal is low, as shown for green (grayish B) and purple (gray).

NOTE.—CIE=Commission Internationale de L'Eclairage.

TABLE 2.—*Specifications and CIE Coordinates for Color Tolerance Charts for Use With Labels and Placards Surfaced With Ink*

Color/series	Munsell notation	CIE data for source C		
		Y	x	y
Red:				
Central series:				
Central color	6.8R 4.47/12.8	15.34	.5510	.3286
Grayish	7.2R 4.72/12.2	17.37	.5368	.3348
Purple	6.4R 4.49/12.7	15.52	.5442	.3258
Purple and vivid	6.1R 4.33/13.1	14.25	.5529	.3209
Vivid	6.7R 4.29/13.2	13.99	.5617	.3253
Orange	7.3R 4.47/12.8	15.34	.5572	.3331
Orange and grayish	7.65R 4.70/12.4	17.20	.5438	.3382
Light series:				
Light	7.0R 4.72/13.2	17.32	.5511	.3322
Light and orange	7.4R 4.96/12.6	19.38	.5365	.3382
Light and purple	6.6R 4.79/12.9	17.94	.5397	.3289
Dark series:				
Dark A	6.7R 4.19/12.5	13.30	.5566	.3265
Dark B	7.0R 4.25/12.35	13.72	.5522	.3294
Dark and purple	7.5R 4.23/12.4	13.58	.5577	.3329
Orange:				
Central series:				
Central color	5.0YR 6.10/12.15	31.27	.5193	.4117
Yellow and grayish A	5.8YR 6.22/11.7	32.69	.5114	.4155
Yellow and grayish B	6.1YR 6.26/11.85	33.20	.5109	.4190
Vivid	5.1YR 6.07/12.3	30.86	.5226	.4134
Red and vivid A	3.9YR 5.87/12.75	28.53	.5318	.4038
Red and vivid B	3.6YR 5.91/12.6	29.05	.5291	.4021
Grayish	4.9YR 6.10/11.9	31.22	.5170	.4089
Light series:				
Light and vivid A	5.8YR 6.78/12.7	39.94	.5120	.4177
Light and yellow	6.0YR 6.80/12.8	40.20	.5135	.4198
Light and vivid B	4.9YR 6.60/12.9	37.47	.5216	.4126
Dark series:				
Dark and yellow	5.8YR 5.98/11.0	29.87	.5052	.4132
Dark A	5.1YR 5.80/11.1	27.80	.5127	.4094
Dark B	5.0YR 5.80/11.0	27.67	.5109	.4068
Yellow:				
Central series:				
Central color	4.3Y 7.87/10.3	56.81	.4445	.4589
Vivid A	4.5Y 7.82/10.8	55.92	.4503	.4658
Vivid B	3.3Y 7.72/11.35	54.24	.4612	.4624
Vivid and orange	3.2Y 7.72/10.8	54.25	.4576	.4572
Grayish A	4.1Y 7.95/9.7	58.18	.4380	.4516
Grayish B	5.1Y 8.06/9.05	60.12	.4272	.4508
Green-yellow	5.2Y 7.97/9.9	58.53	.4356	.4605
Light series:				
Light	5.4Y 8.59/10.5	70.19	.4351	.4628
Light and green-yellow	5.4Y 8.56/11.2	69.59	.4414	.4692
Light and vivid	4.4Y 8.45/11.4	67.42	.4490	.4662
Dark series:				
Dark and green-yellow	4.4Y 6.57/9.7	51.82	.4423	.4562
Dark and orange A	3.4Y 7.39/104	48.86	.4584	.4590
Dark and orange B	3.5Y 7.41/10.0	49.20	.4517	.4544
Green:				
Central series:				
Central color	9.75G 4.26/7.75	13.80	.2214	.3791
Grayish	10G 4.46/7.5	15.25	.2263	.3742
Blue A	1.4BG 4.20/7.4	13.36	.2151	.3625
Blue B	1.0BG 4.09/7.75	12.60	.2109	.3685
Vivid	8.4G 4.09/8.05	12.59	.2183	.3954
Vivid green-yellow	7.0G 4.23/8.0	13.54	.2292	.4045
Green-yellow	7.85G 4.46/7.7	15.23	.2313	.3914

TABLE 2.—*Specifications and CIE Coordinates for Color Tolerance Charts for Use With Labels and Placards Surfaced With Ink*—Continued

Color/series	Munsell notation	CIE data for source C		
		Y	x	y
Light series:				
Light and vivid	9.5G 4.45/8.8	15.21	.2141	.3863
Light and blue	0.2BG 4.31/8.8	14.12	.2069	.3814
Light and green-yellow	8.3G 4.29/9.05	14.01	.2119	.4006
Dark series:				
Dark and green-yellow	7.1G 4.08/7.1	12.55	.2354	.3973
Dark and grayish	9.5G 4.11/6.9	12.70	.2282	.3784
Dark	8.5G 3.97/7.2	11.78	.2269	.3874
Blue:				
Central series:				
Central color	3.5PB 3.94/9.7	11.58	.1885	.1911
Green and grayish A	2.0PB 4.35/8.7	14.41	.1962	.2099
Green and grayish B	1.7PB 4.22/9.0	13.50	.1898	.2053
Vivid	2.9PB 3.81/9.7	10.78	.1814	.1852
Purple and vivid A	4.7PB 3.53/10.0	9.15	.1817	.1727
Purple and vivid B	5.0PB 3.71/9.9	10.20	.1888	.1788
Grayish	3.75PB 4.03/9.1	12.17	.1943	.1961
Light series:				
Light and green A	1.7PB 4.32/9.2	14.22	.1904	.2056
Light and green B	1.5PB 4.11/9.6	12.72	.1815	.1971
Light and vivid	3.2PB 3.95/10.05	11.70	.1831	.1868
Dark series:				
Dark and grayish	3.9PB 4.01/8.7	12.04	.1982	.1992
Dark and purple A	4.8PB 3.67/9.3	9.95	.1918	.1831
Dark and purple B	5.2PB 3.80/9.05	10.76	.1965	.1885
Purple:				
Central series:				
Central color	9.5P 4.71/11.3	17.25	.3274	.2165
Red	1.0RP 5.31/10.8	22.70	.3404	.2354
Red and vivid A	1.4RP 5.00/11.9	19.78	.3500	.2274
Red and vivid B	0.2RP 4.39/12.5	14.70	.3365	.2059
Vivid	8.0P 4.04/12.0	12.23	.3098	.1916
Blue	7.0P 4.39/10.8	14.71	.3007	.2037
Grayish	8.8P 5.00/10.3	19.73	.3191	.2251
Light series:				
Light and red A	0.85RP 5.56/11.1	25.18	.3387	.2356
Light and red B	1.1RP 5.27/12.3	22.27	.3460	.2276
Light and vivid	9.2P 4.94/11.95	19.24	.3247	.2163
Dark series:				
Dark and grayish	9.6P 4.70/10.9	17.19	.3283	.2204
Dark and vivid	8.4P 4.05/11.6	12.35	.3144	.1970
Dark and blue	7.5P 4.32/10.5	14.19	.3059	.2078

TABLE 3.—*Specification for Colors for Use With Labels Printed on Packagings Surfaces*

CIE data for source C	Red	Orange	Yellow	Green	Blue	Purple
x	.424	.460	.417	.228	.200	.377
y	.306	.370	.392	.354	.175	.205
x	.571	.543	.490	.310	.255	.377
y	.306	.400	.442	.354	.250	.284
x	.424	.445	.390	.228	.177	.342
y	.350	.395	.430	.403	.194	.205
x	.571	.504	.440	.310	.230	.342
y	.350	.430	.492	.403	.267	.284
Y (high)	23.0	41.6	72.6	20.6	15.9	21.2
Y (low)	7.7	19.5	29.1	7.4	6.5	8.2

(49 U.S.C. 1803,1804,1808,49 CFR 1.53).

NOTE.—The Materials Transportation Bureau has determined that this final rule will not result in a major economic impact under the terms of Executive Order 12044 and DOT implementing procedures (43 FR 9582). A regulatiory evaluation is available in the docket.

Issued in Washington, D.C., on February 6, 1979.

L. D. SANTMAN,
Director, Materials Transportation Bureau.

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